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How the Alva was Patched.

Mechanical skill and neatness of workmanship that would pass approval in a dry dock was exhibited in putting a patch over a hole 16-feet square, under water, in the steel steamer Alva while sunk in the St. Mary's river. Upon being pumped out and raised, so as to continue her voyage with a cargo of ore to South Chicago, the Alva, using only a syphon to dispose of a little water, was in condition to make an Atlantic voyage, although repairs to the big hole in her side, caused by being run into by one of the whaleback barges, had all been made by divers working entirely under water.

Capt. Mart Swain of the wrecking steamer Favorite, which has been engaged on several wrecking jobs of special importance this season, has with him an Indian diver, Adam Kiosh, who is a good ship carpenter and who has had some training in the higher branches of ship building. Before the Favorite was called to the Alva, Captains McLeod, Sinclair and others, representing the vessel and the underwriters, had talked over several plans for raising the steamer. The big break in her side was on the starboard quarter, just aft of the engine room gangway. The nose of the whaleback had entered the boat almost to the machinery. Had the break been in the side of the boat, where there was a flat, even surface, there would have been no difficulty in applying timber on the outside and covering it with canvas, but the bilge-like turn of the stern presented a new problem. It was accordingly decided to use dynamite in blowing out the wreckage at the point where the collision had occurred. so as to present as clear a surface as possible for the patch. With so much accomplished, a small bit of dynamite was tried on th e head of one of the numerous rivets which held the plating fast to the frames on either side of the break. It was planned to blow off the heads of rivets and then punch out the rivets themselves. The dynamite not only blew off the head, but also blew out the entire rivet. One after another, the rivets extending through frames were blown out in this way, and then the diver, who had secured the assistance of two men engaged on government work at the Sault, took down templates and by marking them, just as would have been done in constructing a ship, every piece of timber that was to enter into the patch was shaped and prepared, ready for fitting, before it was taken below. Screw bolts were run through the holes in the frames and plating, left by blowing out the rivets, and in addition every piece of timber in the patch was edge-bolted. It will thus be seen that the covering, even had there been no canvas over it, was made tight enough to float the ship when pumped out. The thoroughness of the work explains how it was possible to send the ship on to Chicago without even a single steam pump at work.

On the United States cruiser Columbia's fast run across the Atlantic, the highest speed for an hour was 20.6 knots, and the best speed for four hours was 80.5 knots. On the day of the fastest run the average revolutions for the starboard engine was 105.8 and for the port engine the same, while for the center engine it was 105.7. The coal consumption that day was 225¼ tons for the 462 miles run. The boilers carried 140 pounds pressure to the square inch. The maximum horse power developed was 19,916. The average speed for the entire run was about 18.55 knots. It must be remembered, of course, that the ship was not running under full power. The average horse power for the entire trip was less than half the ship's full power, which is 21,000. Her instructions were, first to run under natural draft and then, during the last twenty-four hours, to run under forced draft; the latter, however, proved impracticable on account of difficulty in getting out coal, due to smallness of crew and distance of coal from fire room. The chief engineer of the ship has been quoted as stating that the Columbia would have made faster time on this run if the middle screw had been taken off. This statement is correct when using half power, which she was doing on this run. The ship was designed to run with two screws when running under half power, with three screws when working at full power, and with one—the center screw—when cruising at low speed.

Some of the Pittsburg concerns operating big furnace plants have had representatives on the lakes of late figuring on machinery for dumping ore cars and otherwise cheapening the cost of handling ore in furnace yards. Success attained with car dumping machines in the lake coal trade has prompted the furnace owners to look for the adoption of similar methods in handling ore, and it is understood that the Carnegie company is about to let a contract for a big plant of this kind.

Experimental Tanks for Ships' Models.

Unfortunately there is no truth in the report that Chief Constructor Philip Hichborn, U. S. N., has ordered the construction of an experimental tank for the trial of models of war vessels at the Washington navy yard. Under date of August 19, Mr. Hichborn says in a letter to the REVIEW: "The article about an experimental tank was an elaboration upon a few simple experiments we hope to make—not in a tank, however; and from which we hope to get such data as may lead to an appropriation. In the meantime we prefer silence."

Repeated efforts have been made by the navy department to secure from congress an appropriation for a tank for experiments with models of ships, with a view to at least keeping pace with other countries in study of the question of resistance and speed, but as in many other matters pertaining to ship building, these efforts have failed, on account of the lack of a proper understanding in congress of the importance of the matter. Tanks of this kind are used with valuable results by the natives of Great Britain, Germany, France and Italy, and one of them, owned by a private concern, Messers William Denny & Bros. of Dumbarton, Scotland, was described and illustrated in the REVIEW of August 17, 1893. One great drawback in connection with the few tanks of this kind thus far built throughout the world, is the manner in which the great mass of information obtained from them is buried as regards the distribution of scientific knowledge. Should the efforts of our navy be successful, there is little doubt that the builders of merchant vessels in the United States would be permitted to share the benefits of experiments.

Protesting Against a Center-Pier Bridge.

Chicago vessel owners have secured the aid of the Lake Carriers' Association in opposing, through the war department, the plans of the public works department of the city of Chicago to erect at North Halsted street a bridge with a pier in the center of the river. Capt. J. G. Keith, one of the vice-presidents of the association, has kept the Cleveland officers informed regarding the plans in Chicago for this bridge, and as a result a telegram protesting against the erection of a bridge with center pier was sent to the secretary of war by Mr. J. C. Gilchrist, first vice-president, on Wednesday. This will be followed up later by a full explanation to the war department by Secretary Keep, who is at present absent from his office in Buffalo. Mr. Gilchrist's telegram explained that what is wanted is a folding or lift style of bridge, such as is in use at Van Buren street. The increased size of vessels now building requires a channel of at least 100 feet in all parts of the Chicago river, and it is only a matter of time when every bridge in the river must be of a kind that will permit of free navigation in the center of the channel.

When a streak of ill-luck follows a vessel captain in the ship he is sailing, the management of the vessel is almost certain to make a change, no matter what may be thought of the ability of the man in charge. There is an unwritten law in two or three of the Buffalo lines, that reduces the rank of a captain every time he meets with a serious accident. Capt. Holmes of the steamer Alva has been in the Bradley line for twenty-four years. This season he has met with two costly accidents, and as a result it is announced that he will be succeeded in command of the Alva by Capt. John H. Wysoon, who was in the wooden steamer Gladstone, and who has within a few years been advanced in the Bradley service from command of a tug to the best boat. Capt. Holmes has taken command of the Gladstone.

A Cleveland firm of ore dealers has offered 80 cents on a quantity of ore to be moved from Escanaba to Ohio ports between Sept. 1 and the close of navigation, but no vessel owner has been found to accept the proposition, although the going rate at present is only 55 cents. This is an indication of the strong feeling that prevails in the freight market on account the probability of high fall grain freights. The action of Duluth grain shippers in refusing to load A 2 vessels while they can get ships of higher rating is very probably prompted by the low rates at which grain insurance was covered this season by blanket contracts.

On Wednesday next at South Chicago the largest steel tow barge in the world, the Aurenia, being built by the Chicago Ship Building Co. for John Corrigan and others, will be launched. The boat will be christened by Mr. Corrigan's daughter. The Aurenia is 365 feet over all and 44 feet beam, and it is expected that she will carry about as much as the 400-foot steamers. Her owners are figuring on moving with her 4,000 gross tons of ore each trip from Lake Superior when the draft of water is full 14½ feet.

Steam Shovel Mining on the Mesabi.

Three systems of mining are pursued, the choice being directed by surrounding conditions. The first, for which the range has grown famous, is the mining with the steam shovel. It is possible when the relation between thickness of stripping and thickness of ore is such that it pays to recover the overburden. The managers on the range state that within certain limits it pays to strip one foot in thickness of the glacial drift for each foot of good ore recovered. There is no doubt that this can be done very cheaply, particularly when the track system is so arranged that the steam shovel is kept busy steadily. At a number of the mines the full cars must be hauled away from the shovel out of the cut before a new string of empties can be brought into place. At the Mountain Iron mine this is avoided by a through cut, so that ore can be handled almost continuously. The Biwabik, too, is preparing for work under similarly favorable circumstances. Of course, enormous quantities of material can be excavated in this manner at a very low cost. It is quite generally believed that a bench of from 18 to 20 feet high is the most advantageous for steam shovel work. At the majority of the mines the bank is loosened with explosives as an aid to the shovel. At the Mahoning Valley mine a specially heavy shovel has begun work recently, of which it is expected that it will do the work without the aid of explosives. Somewhat conflicting statements are made as to the number of men employed per steam shovel. The crew proper of the steam shovel, with the attendant crews of the ore trains, is, of course, pretty well defined. But estimates vary widely when it comes to figure in the track layers, drillers, roustabouts, blacksmiths, etc. In one case we were told that the total number of men employed per shovel at active work was about seventy. In some of the mines the number appeared to be larger. Still with the work done with one shovel, as shown by the record made of over 6,000 tons per day, it will be recognized that the labor cost is low. On the whole it may be stated that the ideal conditions for steam shoveling are met with in only a few instances on the range. As greater depth is attained, even in working the deposits now so exploited, increasing trouble with water and the alteration of steep grades or long hauls will force a change to the second system of mining known as the milling system.—Iron Age.

Objections to Great Division of Boiler Power.

Editor MARINE REVIEW: It occurs to me that the following paragraph, taken from one of the engineering journals, might interest your subscribers. It relates to the number of water tube boilers in the new English battleships, Powerful and Terrible I think their names are:

"Where large boiler power and high pressure are required it has become the practice to divide the boiler plant into many small units, instead of fewer boilers of larger size. While this may be essential or desirable from the necessity of keeping members or details of small diameter where high pressures are used, it is objectionable from some practicable points of view. It very much increases the cost of installation, for it is more expensive to make twenty small boilers than ten of double their capacity; it increases the number of details required, for each unit must have its own valves and fittings, and it takes more room in the ship, for two boilers, each of a given capacity, can not be put in the space of one boiler of their combined capacity. It also very greatly increases the expense of attendance and maintenance, for doubling the number of units in a steam plant requires that each boiler be closely watched as to its performance. It should also increase the consumption of fuel in some degree. We doubt if the evaporative efficiency of 300 tons of coal burned under twenty boilers is as high as the same quantity burned under ten boilers. These observations have been induced by the fact that an English warship now building is to have no less than forty-eight separate boilers in her. There are in them 7,200 tubes, and consequently 14,400 tube ends to keep tight. Consider further, as previously remarked, that each boiler must have its own outlet and inlet valves, fittings, appurtenances and belongings, and we get some idea of what is entailed by putting many small boilers into a vessel."

It seems to me "terrible" to think of forty-eight separate boilers in one of these ships to look after, with 7,200 tubes and 14,400 tube ends to keep tight. I don't know how you look at this matter, but it strikes me very forcibly that there will be a "continual battle" on board the ships to keep these boilers in order with their valves and fittings, and other things that belong to them, to say nothing of the number of men that must be employed to attend to this multiplicity of steam generators. I sincerely trust that no such foolishness as this will enter into the heads of any of our naval authorities on this side of the Atlantic, and I predict that within a comparatively short time they will "bounce" these forty-eight boilers out of these ships and substitute the Scotch marine or some other type of fire tubular boiler for them. There is one advantage, however, not to be overlooked, viz., "that fighting the leaks in the tube ends" will be good practice for the men, and keep them "alert and wide awake," in case their services should be required in some other direction in actual warfare.

I avail myself of this opportunity to make a correction in an article published in the REVIEW of April 11, regarding the relative consumption of fuel by the Seaford and La Tamise, viz., that the difference of 36 per cent. in favor of the Seaford is on the round trip between New Haven and Dieppe, and not on the single run of 3¼ hours between ports. But the saving of 36 per cent in fuel in 6½ hours' steaming is not a bad showing for the Scotch marine type of boiler with Serve ribbed tubes in the Seaford, as compared with the Belleville water tubular boilers in La Tamise. This correction has been sent me from the other side since the publication of the article by Mr. Ellis in the London Times, and since the issue of your paper of April 11.

CHAS. W. WHITNEY,

New York, N. Y., August 17, 1895.

Test of Steamer Rappahannock.

Editor MARINE REVIEW: A serious error occurs in the report of the test of the steamer Rappahannock in the last issue of the REVIEW, and your printer has not helped to make it any better. The steam used by auxiliaries has been deducted twice, making the apparent net water consumption 13.41 pounds per I. H. P. and not 13.07 as printed.

Deduction was first made by Messrs. Goodenough and Parrish from the feed water, which should thus read, 73,676.72 pounds instead of 70,103.75 pounds. The writer afterwards deducted the second time, so that the net water consumption per I. H. P. is really 14.07 pounds. It should be added also that this figure is corrected for moisture in steam as observed by calorimeter test.

We are well enough satisfied, even with these figures, and all that has been said as regards the excellence of the performance still holds good, though we regret exceedingly that the error was not detected sooner.

FRONTIER IRON WORKS,
Per H. PENTON,

Detroit, Mich., August 17, 1895.

In General.

Capt. Geo. W. Girdon, who was for twenty years connected with the United States steamboat inspection service at Chicago, died at his home in that city on the 16th inst. He was eighty-one years of age.

Work was begun recently on the Lake Washington canal and the filling in of tide land south of Seattle, Wash. The filling in of tide lands will reclaim 1,500 acres, and the harbor will be connected with Lake Washington by a ship canal capable of receiving the largest vessels. Work is to be completed in six years, and the estimated cost is $6,000,000.

The Austrian government has decided to try Belleville water tube boilers in the battleship Buda-Pesth, now building at Trieste. She will develop 8,500 indicated horse power under natural draught, and the boilers will have a collective grate area of 720 square feet, and a heating surface of 22,500 square feet. Two similar vessels will be fitted with multitubular boilers, so that on the trials the merits of the two systems will be thoroughly gone into.

The production of coal throughout the world in 1894 was estimated at 553,700,000 tons. In this total the United Kingdom figured for 185,000,000 tons, Germany for 74,000,000 tons, France for 25,250,000 tons, Belgium for 19,500,000 tons, Austria and Hungary for 10,350,000 tons and the United States, for 170,000,000 tons. It is estimated that 5,000,000 tons of coal were raised last year in Australia and New Zealand, 4,000,000 tons in Canada, and 3,000,000 tons in British India.

Since the Pennsylvania Company, operating the Cleveland and Pittsburg railway into Cleveland, has acquired valuable dock property just east of the Cleveland harbor entrance, through the filling up of a part of the breakwater enclosure, there has been considerable talk of merchandise docks being constructed in this part of the lake front. Recently the Pennsylvania Company has been engaged in building a dock within the breakwater for the Cuddy-Mullen Coal Co., and it has been several times reported that arrangements were pending between the railway managers and the Northern Steamship Co. for the construction of a large dock suited to the freight and passenger business of the Northern line. As yet, however, there is nothing definite in the matter. Mr. F. P. Gordon assistant general manager of the Northern company says: "We had this matter up with the railway company last winter. We should probably be inclined to consider favorably a proposition that would tend to furnish us dockage facilities in the outer harbor, but as far as the Pennsylvania railway part of it is concerned, it rests entirely with that company, and the matter has not been taken up between our respective companies since negotiations were broken last January."

The Grain Outlook.

If estimates regarding the northwestern grain crop are correct, it would seem that vessel owners are certain of profitable lake freights from the head of Lake Superior before the present season is at an end. It is certain that iron mines at the head of the lakes, nearly all of which are producing bessemer ore, will be worked to their utmost capacity throughout the season. Within the past few days lumber shippers have advanced rates, in order to attract tonnage to Duluth and Ashland. It was estimated early in the season that the shipments of lumber from all Lake Superior points would be full 100,000,000 more than they were in 1894, but now with lumber sales very active it is found that the St. Mary's Falls canal records show an increase to August 1 of only 31,214,000 feet. Thus in advance of any movement of grain, the demand for vessels to carry ore and lumber is constantly exceeding the supply, and it is well known also that coal shipments are short of what they should be, in view of the large quantity of coal that will be needed to care for a big grain crop.

All estimates place the wheat crop of Minnesota, the Dakotas and Manitoba at full 200,000,000 bushels, of which Manitoba will produce some 25,000,000 bushels. In 1891 Minnesota and the Dakotas harvested 160,000,000 bushels. The average since wheat became a leading crop has been about 115,000,000 bushels. The mills of Minneapolis and Duluth consume not far from 55,000,000 bushels, and at least 25,000,000 more will be needed for seed and bread. This will leave for shipment east not less than 90,000,000 bushels, in all probability. Never has there been shipped from Duluth more than 45,000,000 bushels on a single crop. It is expected that Minneapolis will ship largely by rail to mills in the south and west, but the water shipments from Duluth will far exceed anything known. An increased movement of flour is, of course, assured also.

An Immense Dry Dock.

Some very big dry docks have been built in this country of late years, and others now under way, notably those being built by the navy department, are of large proportions, but it is doubtful if any of these projects will prove equal to the big dry dock just completed at Southampton, England, for docking Atlantic passenger ships like the St. Louis, Paris and New York. The Southampton dock was constructed in submerged mud land and the time taken up in the work was only two and a half years. The dock has a length on the floor of 750 feet. The width at sill level is 87 feet 6 inches, and at the cope 112 feet. At high water, ordinary spring tides, the depth of water over the sill in the centre is 35 feet, but as the sill has an invert, with a radius of 194 feet, the depth at the side is reduced by nearly 5 feet. A minimum depth of 31 feet is, however, more than sufficient, in view of the fact that in all harbors the present limit is 27 feet or 28 feet. There will be within the dock a depth of 29 feet over the top of the keel blocks at ordinary low tides, and 32 feet 6 inches with spring tides. The width of the dock itself is 87 feet 1 inch at the bottom, and 112 feet at the top of the altars.

The first operation in the work of construction was the enclosing of an immense area of reclaimed mud land with a chalk embankment 18 to 20 feet wide. A grip was first dredged in the mud down to the peat. This grip was 12 feet wide at bottom, and the chalk being tipped in, it formed a good key for the embankment, which was raised to a level 6 feet above high water at spring tides. The slopes exposed to the wash of the sea were stone-pitched, all parts being carefully sealed with excavated material. Sluices were put in through the bank, but were not required. The area was then pumped dry. About 1,200 men were continually employed on the work and the value of the contractors' plant is estimated at $450,000. The plant included eight locomotive engines, eight portable engines, forty steam cranes, eighteen steam pile engines, five tug boats, two steam launches, two steam hoppers, four steam dredgers, twenty-five barges, twenty-three steam pumps, 500 contractors' wagons, and 900 tons of rails used in the temporary railways. The extent of material used shows the amount of work done. Of chalk 470,000 cubic yards were used. The material excavated for the dock totalled 230,000 cubic yards, and of concrete there was used 84,000 tons of eight to one and 15,000 tons of richer kinds. Of granite 45,000 cubic feet were worked into the dock. Beyond the dry dock works, in the other reclamation and wharf works, there were 30,000 cubic yards of stuff excavated, and 1,063,000 tons of dredging. There were used on the wharves 14,000 cubic feet of timber, 251,000 cubic feet of pitch pine and other timber, 23,000 tons of Portland cement, and 142 cubic yards of ballast.

The dock is built of Portland cement concrete faced with bricks, and the brickwork itself is faced with blue bricks. The altars, coping, caisson stop, and sluice faces are all made of Cornish granite. There are three flights of steps from the surface to the floor of the dock, which when dry has the appearance of an immense space considerably greater than can be filled by the largest steamer yet constructed. The emptying of the dock is performed by two 18-inch direct acting pumps, which are capable of drawing off the water in from one and a half to two hours. The discharge of water is at the rate of 500 tons per minute. The dock contains, when filled, sixteen and a quarter millions of gallons. Six boilers, 30 feet long and 7 feet 6 inches diameter, supply steam for pumping machinery, cranes, capstans, etc. One traveling crane, worked in connection with the dock is capable of lifting 30 tons.

In the construction of the ship caisson at the entrance to the dock 450 tons of iron were used, and it is ballasted with about 460 tons of cast-iron cantiledge. It was built near the dock, and, after completion, was launched forward and lowered into position. The caisson is 95 feet long on deck, and has an extreme breadth of 25 feet and depth of 45 feet. It is raised and lowered in the water by means of valves, and when it is buoyant with the water inside the dock, on the same level as that outside, it is floated into a recess provided for it, and thus any vessel may pass in or out of the dock.

Peculiar Engines in a Side-Wheel Steamer.

As light draft side-wheel steamers are becoming more numerous on the lakes each year, a description of engines recently fitted to a boat of this kind built by Laird Bros. of Birkenhead, England, will be found interesting. The boat is 220 feet long between perpendiculars, with a beam of 26 feet and a depth of but about 12 feet. The engines are noteworthy for the reason that the problem was to get about 2,500 horse power into the shallow hull with the least possible weight and with the least available space. This has been effected by combining inclined oscillating engines.

There are two diagonal high pressure cylinders, 28½ inches diameter, and two low pressure vertical oscillating cylinders, 50 inches in diameter, the stroke of all four pistons being 5 feet. There are two cranks only, each crank being driven by one inclined and one oscillating cylinder. The intermediate shaft is cut in two and fitted with a coupling clutch. When this is thrown out of gear one paddle-wheel can go ahead and the other astern The coupling consists of a disc, in which are a number of cylindrical holes keyed on the board crank shaft, and a similar disc into which are screwed an equal number of round steel pins, which slides on a fast feather in the starboard shaft. When the pins enter the holes both engines run together. But they can run equally well without this coupling, which is only rendered necessary to prevent racing when the ship in rolling buries one wheel, lifting the other out of the water. Each pair of cylinders is provided with its own surface condenser in the wing, and supplied with cooling water by centrifugal pumps. There are two-single-acting vertical air pumps, one for each engine, worked with the bilge and feed pumps by bell crank levers off the diagonal crosshead. The shaft and piston rods are of steel. The high pressure cylinder has piston valves and the low pressure slide valves, all worked by link motion. Steam is supplied by two large locomotive boilers, which closely resemble railway boilers in design. Each boiler has, however, two distinct fire boxes, and the firing holes come down to the level of the grate bars to facilitate cleaning fires. The pressure is 130 pounds. The box end of the boilers, which stand side by side fore and aft in the boat, are next the crank shaft. There is a transverse bunker, which divides the engine from the boiler room, with a passageway amidships through the bunker. The funnel is a very flat ellipse in cross section, and double; that is to say, there is an inner and outer funnel. Draft is obtained by the aid of a large fan in the base of the funnel. The fan is about 4 feet in diameter, and is driven at a moderate velocity by a vertical single-cylinder engine in the port side of the fidley house, on the level of the main deck. The uptakes of the boilers open into the eye of the fan on the port and starboard, the fan shaft running athwartships. The shaft is cased in a tube several inches larger. This tube opens inside into the fan, so that a current of cold air is drawn continually between the tube and the shaft. This keeps the shaft quite cool, and no difficulty at all has been experienced with the bearings. The draught produced is very good. At a moderate speed it is equal to 1 inch of water in the asphits. The stokehold is very cool, and there is a total absence of dirt and dust, necessarily concomitants of the closed stokehold system. The vessel has shown a speed of 18½ knots.

Another steamer, the C. W. Elphicke, drawing only 14 feet of water, has struck the obstruction in Lake Erie near Pelee point light which was found recently by the J. C. Lockwood. Captains of both vessels give about the same location for the obstruction—S. E. by S. 4½ miles from Pelee point light. It is in Canadian water, and on this account the United States light-house officials will probably have nothing to do with putting a buoy on it. The hydrographic office has been notified of the discovery, but this service can not, of course, do anything more than to give publicity to the fact that such an obstruction has been found.

A Warship's Race Across the Atlantic.

Looked at from whatever point of view, the recent performance of the United States cruiser Columbia in crossing the Atlantic from the Needles, near Southampton, to Sandy Hook light-ship, off the American shore, in a little less than seven days, is unparalleled in naval history. We have become so accustomed to hearing of the phenomenal bursts of speed of warships of all naval powers on measured mile runs, only to be told in almost the same breath that these speeds are never really counted upon as possible of attainment in subsequent regular work, that a seven-day trip across the Atlantic by any man-of-war was, until now, considered quite beyond the realms of likelihood. Trial trip records, it must be remembered, are made with the ship fresh from the dry dock, with a clean bottom, a picked crew, picked coal and the best of weather, and with every possible human precaution taken to get, in the short period of four hours, the utmost that is in the vessel in point of speed—something far above the average. Once through the trial, the ship, which has thus attained the rank of a 22-knot vessel, mayhap, often settles down to a plane of comparative mediocrity, and is not apt to be again called upon to practically demonstrate that she was at one time capable of doing that with which she has been credited by the official records. In the machinery of the modern fighting ship much has been sacrificed to a saving in weight and space, and to the disposition, as nearly as possible, of boilers and engines below the water line. The designer has not had that freedom which is to be found in the planning of any of the fast Atlantic liners' engines, in which reliability of working at maximum duty, day after day, twenty-four hours a day, is the prime consideration, unrestricted by cramped space, the possible effects of an enemy's fire and other conditions little less obstructive to the securing of the best speed results for long continuous periods of time. That a modern cruiser should be able fully to hold pace with one of the crack ocean greyhounds, popularly supposed to be invincible, is, indeed, one of the desiderata aimed at in theory, at least by all the naval authorities, but to accomplish this is quite another thing. It is not too much, therefore, to repeat that the performance of the Columbia in racing successfully, as she did, against so splendid a steamship as the Augusta Victoria, of the Hamburg-American line, stands unparalleled among ships of war, and ought to be a source of genuine pride to the United States navy department and the bureau of steam engineering, as well as to her builders, Messrs. Cramp & Sons of Philadelphia.—Cassier's Magazine.

Meaning of the Terms Tonnage and Displacement.

Ship builders, vessel owners and others, who have to do with the construction and management of ships, understand the meaning of the terms "tonnage" and "displacement" in connection with vessels, but among the general public these terms are often confusing, and an explanation of their meaning, recently prepared by the United States hydrographic office, will prove interesting, although the article has been published quite extensively.

"Tonnage" is assumed by the public, to be either the freight carrying capacity, or the actual weight of the vessel, while in reality it is but a system adopted by most of the governments of the world for the classification of the size or bulk of vessels, as an equitable method of exacting dues according to their respective tonnage laws, and bears no relation to either the freight carrying capacity or the actual weight of the vessel.

The "gross" tonnage of a merchant vessel is obtained by measuring the interior space, or cubic contents, of the hull, the dimensions being taken from the inside edges of the frames and the inside planking or ceiling, up to the underside of the main deck beams. To the cubic contents of the hull is added the cubic contents between the top of main deck and the underside of the deck beams of the deck immediately above. One gross ton is allowed for every 100 cubic feet of contents. Net tonnage is the gross tonnage less all the space, or cubic contents, occupied by the machinery or propelling power, and the quarters for the accomodation of the crew.

The laws governing tonnage dues are very complete, the rates depending upon the tonnage of the vessel and the trade in which she may be engaged. Tonnage dues are always levied on the net tonnage of the vessel. American vessels engaged in domestic trade on inland waters, on rivers, sounds, and coastwise service, are exempt from tonnage dues; but dues are exacted if the vessels engage in any foreign service, unless it be with Germany and the Netherlands, and a few islands, there being a reciprocity tonnage agreement between these governments and that of the United States.

The United States government requires that all vessels of a tonnage of five tons or over shall be registered, and their official gross and net tonnage plainly marked on one of the main deck beams, in a location at all times accessible. All registered vessels have an official number, and owners, upon application, can obtain official signal letters for their vessels. This is usually done where the vessels navigate large bodies of water, and always when they are to be used for transatlantic or coastwise service, "signals" being regarded as a necessity.

The "displacement" of a vessel is its actual dead weight, and it is generally expressed as "tons displancement." When a vessel is launched its draft represents the weight of water displaced, or pressed aside, to accommodate the vessel, the weight of water displaced always being equal to the actual weight of the vessel at that time. The weight of cargo, or freight, is the difference in tons between the light draft displacement, or the displacement of the vessel ready to receive passengers and freight, and her loaded draft displacement when freight and passengers are on board.

No Room for Argument.

Editor MARINE REVIEW: Will you please be kind enough to answer a disputed question through the MARINE REVIEW? Can a steamboat make as good time with a strong head wind as with a wind after her? I claim she can not make as good time with a strong head wind as with the wind after her.

Cleveland, August 19, 1895. WM. A. MICHIE.

Of course no vessel of any kind make as good time against a strong head wind as she can with a strong wind after her. Under some circumstances a vessel may travel faster against a light head wind than she would with a light wind astern, but never against a strong head wind. Light head winds often help to produce draft under boilers, in ships that are at a disadvantage on account of poor draft, but cases in which the speed is actually greater with a fairly strong head wind than it would be with a wind of the same velocity astern are rare.

Great Ore and Coal Railway Scheme.

James Andrews, a Pittsburg engineer who is referred to as an associate of Capt. Eads in the building of jetties at the mouth of the Mississippi, has a substitute for the visionary Lake Erie—Ohio river ship-canal scheme. Mr. Andrews' plans are novel and are interesting on that account if nothing more. His idea is to build a four-rail freight railway between Pittsburgh and the lakes with large cars extending over the four rails and fitted with four trucks, two to each of the two outside rails at each end of the car, which would allow the cars to turn bends as easily as at present. Locomotives with triple boilers would give a vast improvement in power without additional cost for engineer and fireman. At Pittsburg the hillsides are to be taken advantage of for unloading and loading. The cars containing the freight would be run to the edge of an enbankment or sloping hillside, along which hoppers have been built. At the bottom of the hoppers or wooden bins, the ore or other mineral is to be held in place by sliding lids, which can be raised by machinery, allowing the ore to fall into single cars at the bottom of the hill, whence it may be taken to mills and manufactories within the city limits.

When the small cars are loaded the big cars can be run under the hoppers, which contain coal, and loaded. In this manner gravitation does away with the necessity of employing men to load cars and lessens the cost. The hoppers could be built in large numbers along the hillsides at small cost. Using them for storage, as is done with the pockets in the ore docks at upper lake ore shipping ports, would do away with storage houses or yards. Mr. Andrews has figured the cost of such a railway at $12,000,000 to $15,000,000, which is much below the estimate for the proposed ship canal, and he claims that the transportation would be much qnicker and cheaper. But the projectors of the canal are unwilling to give up their pet scheme and intimate that the colonel is "talking through his hat."

New passenger steamers for both the Goodrich and Graham & Morton lines, operating on Lake Michigan, have been talked of for some time past, and it is more than probable that both companies will let contracts before long, although they have been slow in reaching conclusions. It is not the intention to have either of the boats ready until next spring, but it would seem that the present condition of work in the principal ship yards would necessitate prompt action on the part of the management of these lines. The Goodrich company will build a wooden steamer, as it is intended to have her engage in winter service, and although the ship will not be built on plans as elaborate as the Virginia, the principal steamer of the line, she will be quite a costly boat. It is probable that the contract will go to the Detroit Dry Dock Co., as Mr. Frank E. Kirby of that company was some time ago engaged on matters pertaining to the design of the boat. The Graham & Morton Co. is planning for a very large side-wheel steamer that will probably cost $300,000.

The announcement by cable from Southampton, England, that the American line steamer St. Louis on Tuesday maintained a speed of 22.3 knots for four hours in the English channel was a big surprise in shipping circles. This speed is far in excess of the requirements involved in the mail subsidy, which was dependent upon success of the trial. United States naval officers were sent to England to make the trial, as it was more convenient to the owners of the vessel to have her detained from regular service for this purpose on the other side. On a large part of the trial run the St. Louis made 23.6 knots.

Around the Lakes.

Capt. J. M. Clossey, late of the steamer Rochester, has taken command of the steamer Owego.

Welland canal authorities have issued an order to locktenders to allow no vessels in the canal drawing more than 13 feet 6 inches.

Owners of the 400-foot steamer Zenith City, which has been launched and is nearing completion at South Chicago, also talk of sending her to Escanaba for a big ore cargo.

Capt. N. S. Whipple of Detroit has sold his one-half interest in the steamer Raleigh and consort Tokio, to Henry Wineman, Jr., for "$2 and other valuable consideration."

Ore shipments out of Ashland, up to and including August 11, aggregated 1,454,799 gross tons, of which 691,466 tons was from the Wisconsin central docks and 763,333 tons from the North Western docks.

F. W. Denton, mining engineer, who has been with the Minnesota company at Soudan, Minn., has resigned to take up the position of assistant inspector of mining at the state university, Minneapolis.

Baker Bros. of Detroit are said to have submitted a bid for raising the Britannic, that will probably be accepted by the underwriters. They will also raise the lumber steamer Nellie Torrent, sunk a few days ago at Port Huron.

About 8,000 passengers are said to have been carried on the two Northern line passenger stermers since the opening of navigation—June 11 to Aug. 1. On her last round trip the North Land is reported to have had in all 694 passengers.

Excursion business out of Cleveland has been heavier this season than ever before. Saturday night runs of the D. & C. line to Detroit and the C. & B. line to Buffalo and Niagara have taxed the full capacity of the side wheel boats of both companies.

A steel steam yacht, the Saphire, which was built by the Cramps some time ago, is now owned by J. J. Albright of Buffalo. The boat is 137 feet over all, 19 feet 6 inches beam and 9 feet 6 inches draft, and is capable of accommodating eleven passengers.

Log rafting companies keep piling up evidence against their own interests in the contest over the rafting question that will come up in the next congress. Both of the small light-ships marking the Lime-Kiln cut, Detroit river, were carried away by a raft Tuesday.

James Wallace, general manager of the Cleveland Ship Building Company, returned Thursday from a two weeks' sojourn at Nantucket. His grandfather was an old resident of the island, and lived to the age of 99 years. He was in the whaling trade when the island was headquarters for that industry.

Government inspectors in charge of the 20-foot channel work at the lower end of Lake Huron report a shoal with only 15 feet of water over it about 300 yards to the east and 200 yards to the south of Corsica shoal light-ship. They advise masters of deep-draft boats to keep on Lynn's ranges and check down.

Commander Dayton of Chicago, inspector of the ninth light-house district, gives notice that a spar buoy, 25 feet long, painted black, has been placed on Monument shoal, off Monument point, east coast of Green bay. The depth of water at the buoy, which marks the most westerly point of the shoal, is 18 feet.

New lake vessels registered in the office of the commissioner of navigation during the week ending August 10 are: Steam—Penobscot, Port Huron, Mich., 3,502.28 tons gross, 2,864.63 net, No. 150,705; Stone City, Chicago, Ill., 42.01 tons gross, 34.70 net, No. 116,689; Lorella, Buffalo, N. Y., 9.23 tons gross, 6.28 net, No. 141,396. Sail—Clipper, Cleveland, O., 7.39 tons gross, 7.33 net, No. 127,102.

South Chicago tug owners, Hausler & Dunham, talk of building a new boat for harbor service. They are planning on a hull 95 feet long, 20 feet beam and 11½ feet depth, with engines 18 and 26 by 30 inches and a boiler 14 by 9½ feet, allowed 150 pounds steam pressure. An independent condenser, universal shaft coupling and steam steering apparatus are also talked of as modern improvements in the boat.

The 400-foot steamer Victory took only a small cargo of coal out of Ashtabula on her return trip to Lake Superior. It was reported that she had 4,000 tons aboard, and even that amount would be considerably short of her capacity on 14 feet draft, but the fact is she had little more than 3,500 tons on leaving Ashtabula, as the supply at the McMyler car dumping machine ran short, and it was thought advisable to send the steamer out with part cargo, rather than suffer delay in port.

Reports to the hydrographic office from the U. S. S. Michigan direct attention to two shoals on Lake Michigan. Southwestward of Beaver island there is a shoal reported about 1¼ miles long and about ¾ miles wide, with an average depth of between 5 and 6 fathoms of water over it, and with one spot, a rock, with only 20 feet over it. This spot lies 7¾ statute miles W. ⅝ S. from Beaver island light. An examination of Spectacle reef was made by the Michigan on July 15, and it was found that the shoal water (less than 18 feet) extends about 1,000 feet eastward and about 2,500 feet southward from the light-house.

The Conneaut-Port Dover car ferry service will be inaugurated by an excursion today (Thursday) on the ferry Shenango No. 1, from Conneaut to Port Dover and return. Slips with the necessary track approaches have been constructed at Conneaut and Port Dover, and everything is now in readiness for the transfer of loaded cars from the Pittsburgh, Shenango & Lake Erie railway at Conneaut to the Grand Trunk at Port Dover. The Shenango arrived at Conneaut on Friday last and was greeted by the entire populace with brass bands and cannon. She made a trial trip the day following her arrival and some difficulty was then found with her machinery, but probably no more than is incident to bringing out new work in a hurry. Capt. Dougherty is in command of the boat.

It is only a question of time until the excursion business out of Chicago will surpass that of any two lake cities combined. The twin-screw steamer Virginia and the whaleback Christopher Columbus are crowded almost daily, and this condition of business will undoubtedly cause President Goodrich to hurry the completion of plans for the new boat which it is proposed to add to his line. The rate in the Chicago-Milwaukee excursion business, $1 for the round trip, is too low. It is thought that competition from the World's Fair company, owning the Columbus, is kept up with a view to selling the whaleback. Another steamer in the Goodrich line will increase the advantages which that company already holds through having a fleet of ships in the passenger business, that can be more economically managed than a single boat.

Fireproofing Ships of War.

Our navy department has settled to its satisfaction the question of the material to be used in our vessels of war as a substitute for the ordinary inflammable timber. It has adopted the fireproofing process of the Electric Fireproofing Co. of New York, as the result of satisfactory tests with it. In a test experiment witnessed by Secretary Herbert, Capt. Cook, Commodore Hichborn and Naval Constructor Taylor, a piece of yellow pine, 2 inches thick, 12 by 18 inches, was put in the furnace and subjected to 1,000 degrees of heat for five minutes. It rested upon the coals, and during that time it never blazed. When taken out it was charred or carbonized about a half an inch on each side. This carbon forms a protection, and the wood chars slower as it is formed. A piece of ash wood of the same dimensions was subjected to the same degree of heat for twenty minutes, with about the same result. The secretary and the naval officers were much pleased with the test, as it settles an important question in the matter of wood for the new gunboats. It is the intention of the department to have the wood used in these vessels subjected to the new process. The wood work of other vessels, where there is need of protection from fire, will probably also be subjected to test.

Fireproof wood will be used in the construction of the battleship Iowa and the cruiser Brooklyn. Orders to this effect have been issued by Secretary Herbert, and Naval Constructor Linnard, superintending constructor at Cramp's yard, has been directed to carry them out. The process consists in forcing sulphite and phosphate of amonia into the wood by hydraulic pressure. Nothing appears to have been yet settled abroad in this matter. Linoleum seems to be favored by the French, but it is not fireproof. Still they are using it in their recently constructed ships for ceilings, decks, etc., and in some cases covering the armor deck itself with it.—Army and Naval Journal.

Directions for Backing Charts.

Just now vessel masters are providing themselves with the new lake charts that are being published by the United States hydrographic office, uone of which are backed. Some time ago the REVIEW published directions for backing charts with muslin or cotton cloth, and these directions are reprinted now on account of the number of new charts that are being taken aboard vessels:

TO MAKE THE PASTE.—Mix flour and cold water in such proportions that the mixture shall be of the consistency of cream after the flour has been completely macerated. When the mixture is in this condition, apply heat and boil. Stir thoroughly while boiling and continue the cooking until the mixture becomes thick and clear. Then remove from the fire and strain through thin muslin, after which add boiling water and make the paste thin enough to be applied with a brush.

TO BACK THE CHART.—Use a good quality of cotton or linen cloth, which should be cut four inches wider than the chart each way, so as to make a two-inch border all around the chart. Tack or paste the cloth down along its edges and stretch it very gently until flat and smooth. Lay the chart upon a table or flat surface, face down, and cover the back evenly with paste in a coat equal in thickness to a thick coat of paint. Fit the chart to the cloth and smooth it out by rubbing over its face with a dry cloth, pressing from the middle outwards, so as to avoid distortion. Next lay a large piece of wrapping paper upon the chart and press it down firmly with even strokes, so as to make the chart adhere to the muslin throughout. When the chart is dry trim off the surplus muslin.

MARINE REVIEW

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,341 vessels, of 1,227,400.72 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons and over that amount on the lakes on June 30, 1894, was 359 and their aggregate gross tonnage 634,467.84; the number of vessels of this class owned in all other parts of the country on the same date was 316 and their tonnage 642,642.50, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1894, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,731	843,239.65
Sailing vessels	1,139	302,985.31
Canal boats	386	41,961.25
Barges	85	39,214.51
Total	3,341	1,227,400.72

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
Year ending June 30, 1890	218	108,515.00
" " " 1891	204	111,856.45
" " " 1892	169	45,168.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
Total	872	406,976.28

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

(From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			SuezCanal.		
	1894.	1893.	1892.	1894.	1893.	1892.
No. vessel pass'ges	14,491	12,008	12,580	3,352	3,341	3,559
T'n'ge, net registd	13,110,366	9,849,754	10,647,203	8,039,106	7,659,068	7,712,028
Days of Navigat'n	234	219	223	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

REFERRING to the action of the bureau of steam engineering, navy department, in sending to the lakes two engineer officers, who are now engaged in observing the operation of Belleville water tube boilers in one of the twin-screw passenger steamers of the Northern Steamship Co., the Marine Journal of New York says: "While it is very gratifying to find that the navy department is in this respect, as in so many others, enterprising enough to endeavor to obtain the very best available article, yet the reason is not very apparent why our government should take pains to investigate the Belleville boiler, which is a foreign article altogether, in fact of French design, etc. It has been expressly stipulated in the provisions for our new warships that all articles of their construction must be of American manufacture, and why time should be wasted by our naval officials in investigating a French article is therefore not clear." This is a little play to the gallery on the part of our New York contemporary. The gallery is the little army of water tube boiler manufacturers distributed throughout the country. It is not probable that the makers of the better class of water tube boilers, several of whom are fully in touch with all that the government is doing on the boiler question, will be greatly disturbed on account of this investigation. Through this action on the part of the bureau of steam engineering they will have access to information regarding a boiler that has been adopted by the navies of France, Russia, England, Austria and other leading maritime countries—just what they want to develop their own types of high-pressure steam generators. Only through the government can such information be obtained in a complete and reliable manner. The Journal might as well advocate the dismissal of a naval officer who would go aboard a foreign ship to see what "the other fellow" is doing. There would be just as much sense in it, for this is all that is being done in de tailing a couple of officers to observe the performance of these boilers.

IN ALL THE discussion relative to the effect of the Chicago drainage canal on lake levels the REVIEW has held that what is wanted is a reliable report from competent engineers involving the entire lake outflow question. Without accurate determinations regarding the flow of the St. Clair and Niagara rivers, it is impossible to make an estimate of any value regarding the effect of the Chicago canal. Gen. Poe, who is the senior officer of the commission of army engineers who have been looking up the canal question, has not been making any guesses on the effect of the canal. In fact, he seems to be of the opinion that additional information regarding the discharge of the St. Clair river, and at other points, is necessary before a report of any value can be made about the canal, as indicated by the following extract from an interview with him in Chicago: "General O. M. Poe said the data at hand is far from satisfactory, and intimated that it may be necessary to ascertain the exact volume of the discharge of the St. Clair river before a satisfactory estimate could be made concerning the probable extent of the lowering of the lake levels by the opening of the canal. Until the data are more complete, he says, all estimates will be little more than conjecture, and no reliable conclusion will be reached. He commends the report of the drainage board on the subject, and says Mr. Johnson, one of the drainage engineers, has written the most able paper he has seen on the subject."

MR. E. T. CHAMBERLAIN, United States commissioner of navigation, won the confidence and good will of the shipping intereste of the country by securing, through the last congress, several important changes in navigation laws that were in part like ancient history, but which were nuisances while they existed. This work may be continued in the next congress, as indicated by the following suggestion from the Maritime Register of New York: "There are many laws yet on the statute book that if enforced would seriously hamper our shipping. They were passed years ago for special purposes which do not now exist. They had reference to conditions no longer possible and to a navigation system and type of vessels entirely superceded. But they remain and seem to rise up for enforcement, like Banquo's ghost, at most unseenly times, to the confusion of both ship owners and government officers. It would be wise to rake up all these fossils to the end that congress should destroy them. The navigation laws should be thoroughly codified and the useless ones, of which they are many, weeded out. This simplification would leave the field clear for much legislation that is really needed to help and protect our shipping."

CONGRESSMEN JENKINS and Towne of Superior and Duluth, together with other gentlemen interested in harbor improvements at the head of Lake Superior, had a conference a few days ago with Major Sears, the government engineer of Duluth, and it is evident that upon the opening of the next session of congress the efforts of northwestern representatives will be devoted mainly to securing appropriations for dredging to 20 feet depth the entire basin forming the harbors of Duluth and Superior. This work, which will cost about $3,000,000, has the endorsement of the war department, and the people of Duluth and Superior are justified in asking that it be conducted under the continuous contract system. The project should have the support of all lake interests. It is a link of the 20-foot channel work that is of the highest importance. The idea of preparing Duluth and the Superior harbors for the 20-foot channel by securing appropriations for this big dredging job was suggested by Capt. Alex McDougall.

IT WOULD seem from interviews with Messrs. Colgate Hoyt and R. C. Wetmore, published after the recent meeting of the American Steel Barge Co., that stockholders controlling the whalebacks and the ship yard at West Superior are still opposed to building any more vessels on their own account. Their desire to secure some profit from operation of the large number of barges which they already have in commission will probably be realized this season through the arrangements with Pickands, Mather & Co. of Cleveland, which have resulted in the boats being given excellent dispatch. The whaleback tows have in some instanccs made as many trips up to this time as most of the steamers without consorts that are compelled to take chances on dispatch. President Colgate Hoyt of the barge company talks of a probability of more oil barges to build but he says nothing of an increase in the fleet of whalebacks.

IT IS suggested that although electricity is used on shipboard to apparently a large extent, yet it is evident that it could be applied there for many more purposes than it is now. Better arrangements could be made to insure the continuance of its use in times of danger. Electric buttons for the use of stateroom passengers are common, but electric bells to warn or rouse out the occupants are unknown. It is suggested that the off watch should also be called by electric alarms, and that for other purposes electricity could be made more serviceable on shipboard.

LEWIS NIXON says the American yacht Defender will be beaten by Valkyrie III. He bases his prediction upon a series of comparisons from which he concludes that the Defender and Britannia are on a par, and Valkyrie III having defeated the Britannia, he thinks she will defeat the Defender also. Mr. Nixon is a naval architect of high standing and he is exceptionally well posted in yachting matters, but he is undertaking a great deal in giving out a prophesy on the outcome of the big race.

SUBSCRIBERS WILL AVOID DANGER OF MISTAKES BY GIVING THE OLD AS WELL AS THE NEW ADDRESS WHEN A CHANGE IS DESIRED.

Notes From the Yard of F. W. Wheeler & Co.

A water front of over a quarter of a mile, filled with steel steamers under construction, all the way from being plated down to laying of keel, is the interesting sight presented at the ship yard of F. W. Wheeler & Co., West Bay City. In addition to the ships in view, the company has contracts on hand for two others. The total value of contracts on hand is fully $2,250,000. Under the direction of Mr. Wheeler and Mr. Anderson, his assistant, the work has been so systematized and the buildings so arranged that the cost of construction is at a minimum. The whole yard is controlled by a Brown traveling crane, which takes the material from the slab, or shearing and punching machines, and places it where needed. In a short time the buildings covering the machinery will be continuous, and the erection of a large storehouse will permit of a complete clearing of the yard. As there is now so little doing in wooden ship building the wooden yard has been abandoned. Mr. Anderson has completed a system of numbering plates, the record being kept on the model, so that the names of workmen who handled a plate may be ascertained at any time. This system proves valuable in repair work. In the model room at these works one man is kept busy all the time. With the facilities at hand it is not only possible to work out the necessary models of freight steamers, but most elaborate and complete models of finer-lined boats can be prepared when required, the one of the Wapiti being equal to anything turned out abroad.

The wood-work and joiner departments of the ship yard also contain a number of highly skilled workmen. In times when the men of this department are not busy on ships, they are engaged on contracts for other cabinet work, and they have made clock cases that sell as high as $800 apiece. The cabins of an ordinary freight steamer receive most careful attention from these workmen.

Mr. Robert Logan of Cleveland is now engaged as inspector on all ships building at Wheeler's yard.

An inspection of the new Shaw-Eddy steamer Penobscot, which was recently built by Wheeler & Co., and which is to be sailed by Capt. Howard Shaw, developed some interesting information. One feature of construction is the flanging of channels and other parts, an operation which saved about eighty tons without decreasing the strength of the ship. This saving in weight of ship represents about 1,600 tons of additional freight during the season. Another feature new to lake practice is the placing of granulated cork on the under part of the spar deck to prevent sweating. Deck houses are all roomy. The dining room has an alcove partitioned with wooden grill work and containing seats on either side. The guests' room is furnished in sycamore and birch, the former being inlaid. The ceiling is frescoed, the ship building company employing an artist for this work. Plumbing is exposed, and nothing is lacking that one would find in a modern residence. Magnolia metal is used in the engine bearings and magnesia covering for the boilers, but it is applied with paste and covered with sheet iron. The electric plant is the General Electric company's outfit, but was installed by electricians employed by the builders.

Copies of a great number of letters from all parts of the country recommending the blowers, fans and other apparatus made by the Buffalo Forge Co. of Buffalo, N. Y., have been received by the REVIEW. A large number of blowers for draft purposes have been fitted by this company on lake steamers. A letter from the Martin Cantine Co. of Saugerties, N. Y., says: "We had very serious trouble in our factory caused by one-half of our building being used as a dry room, and the other half as a furnishing room, with only a one-inch board partition between, extending within 20 feet from each end. The hot air would get through on the finishing side and cause the ceiling and all of the machinery to sweat so that we frequently had to stop work until we could get both rooms to the same temperature. With an expenditure of less than $800 we ventilated and are keeping in good condition two rooms, side by side, each 300 feet by 25 feet and 17 feet ceiling. The temperature in one is 105 and in the other 72, and there is not the slightest sweating. We can safely say we saved more than our entire expenditure in the first six months after your plans were installed in our building, and we have in addition the pleasure of wholesome air and good temperature for our employes to work in"

A Blue Book just issued strikingly shows the growth of British merchant shipping during the past fifty years. In 1840 the tonnage of British and foreign vessels entered and cleared with cargoes and in ballast at ports in the United Kingdom was 9,439,667 tons, of which 2,949,182 tons were foreign vessels. In 1894 the total was 80,536,359 tons, of which 21,854,712 tons represented the foreign trade.

LAKE ERIE AND LAKE ONTARIO ON ONE SHEET, THE THIRD OF THE HYDROGRAPHIC OFFICE SERIES OF CHARTS, IS NOW IN PRINT AND MAY BE HAD FROM THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING. PRICE 75 CENTS.

ALL NEW HYDROGRAPHIC CHARTS ARE KEPT IN STOCK BY THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on Aug. 17, 1895:

	Wheat, bushels.	Corn, bushels.
Chicago	14,722,000	1,667,000
Duluth	4,992,000	.....
Milwaukee	326,000	.....
Detroit	280,000	86,000
Toledo	1,147,000	156,000
Buffalo	1,066,000	175,000
Total	22,533,000	2,084,000

As compared with a week ago, the above figures show at the several points named a decrease of 1,491,000 bushels of wheat and an increase of 158,000 bushels of corn.

Underwriters who own the wreck of the Cayuga, sunk near the Straits, have had bids from Murphy of Detroit and two other lake wreckers, all of whom agree to raise the boat for a stated sum, with the understanding that if they are not successful they are not to be paid anything. Figures named by these wreckers are said to be reasonable, but the underwriters have concluded that the season is now too far advanced to do anything with the wreck.

A Cleveland vessel owner who was asked a few days ago to make a rate on a quantity of Escanaba ore to be carried from Sept. 1 on to the close of the season, named $1.25 as his figure. Such a rate was, of course, out of the question, but the vessel owner explained that he took a block of 10,000 tons of ore at $1 in '91 and it cost him $1,300 to get the contract, small as it was, off his hands. He is not speculating on fall freights this year

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THREE BOOKS OF SAILING DIRECTIONS, ONE COVERING LAKE SUPERIOR AND THE ST. MARY'S RIVER, ANOTHER COVERING LAKE MICHIGAN AND THE STRAITS OF MACKINAC, AND A THIRD TAKING IN LAKES HURON AND ST. CLAIR WITH DETROIT AND ST. CLAIR RIVERS, ARE NOW OFFERED FOR SALE BY THE HYDROGRAPHIC OFFICE. THESE BOOKS ARE PARTS OF A WORK THAT WILL COVER THE ENTIRE CHAIN OF LAKES. THEY CONTAIN CHARTS OF LEADING CHANNELS AND HARBORS, AND MAY BE HAD FROM THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, AT $1 EACH.

A CHART COVERING LAKE HURON, GEORGIAN BAY AND THE STRAITS OF MACKINAC, ALL ON ONE SHEET, HAS BEEN ISSUED BY THE HYDROGRAPHIC OFFICE AND MAY BE HAD FROM THE MARINE REVIEW AT 75 CENTS. LAKE SUPERIOR ON ONE SHEET IS ALSO IN PRINT AND SELLS AT THE SAME PRICE.

The Nickel Plate road has compiled a list of country homes along the south shore of Lake Erie, willing to accommodate summer boarders, and a copy will be mailed to any address by enclosing a stamp to any agent of the Nickel Plate road, or to B. F. Horner, general passenger agent. Aug. 31—265

U. S. ENGINEER OFFICE, 34 Congress St., Detroit, Mich., August 7, 1895. Sealed proposals for furnishing all labor, materials and appliances, for (A) removing shoals from west approach, St. Marys Fall's canal; (B) removing shoals from east approach, St. Mary's Fall's canal; (C) removing shoals off Six Mile Point, Hay Lake; and (D) removing shoal 29, section 4, ship channel, etc., will be received here until 2 p. m., September 6, 1895, and then publicly opened. All information furnished on application O. M. POE, Col., Engrs.,
Sept. 1.

Barges Wanted

Parties having barges suitable for coal trade, with draft of 11 to 12 feet, and steamer suitable for towing same, and wishing to negotiate for use of same, will please address M., Box B, MARINE REVIEW. Aug. 22.

F. W. WHEELER, President. E. T. CARRINGTON, Vice-President. C. W. STIVER, Secy. and Treas.

F. W. WHEELER & CO.,

West Bay City, Mich.

Builders of all kinds of METAL AND WOODEN SHIPS.

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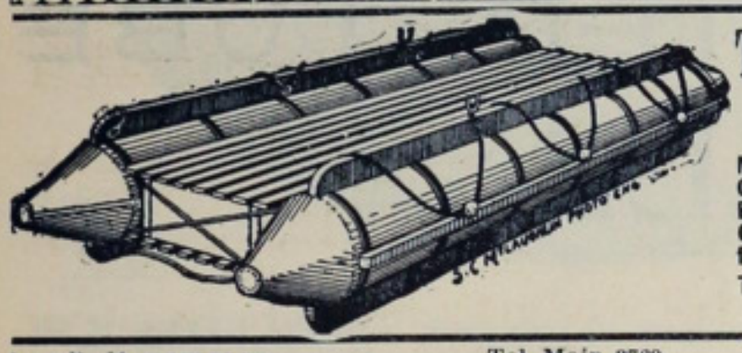
J. B. CARR & CO., Manufacturers, TROY, NEW YORK.



Thos. Drein & Son,

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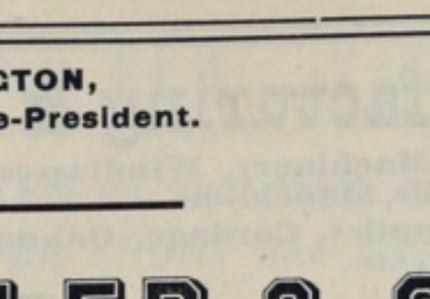

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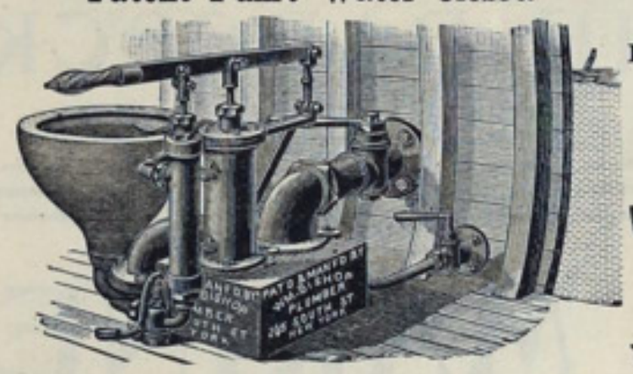

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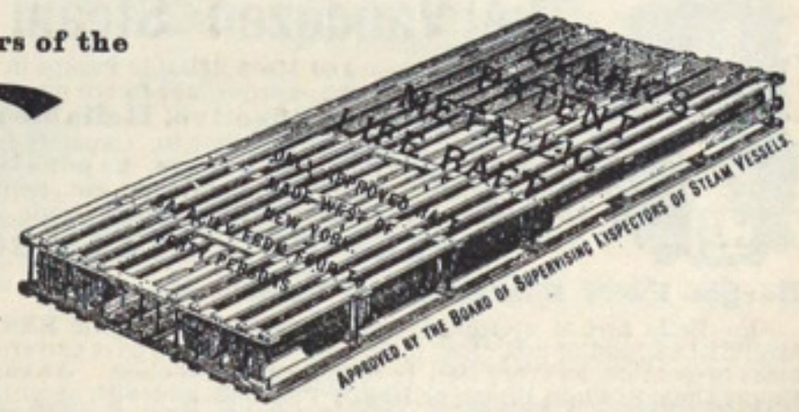

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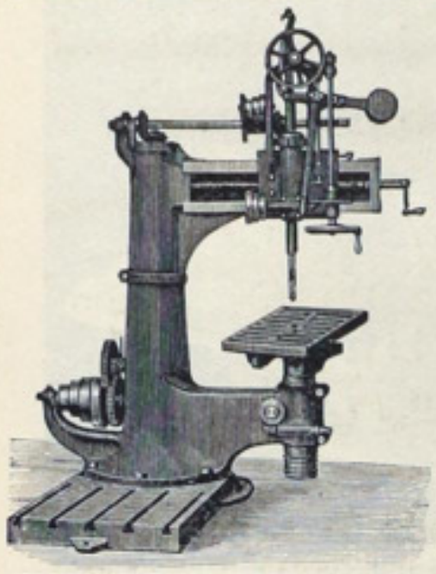

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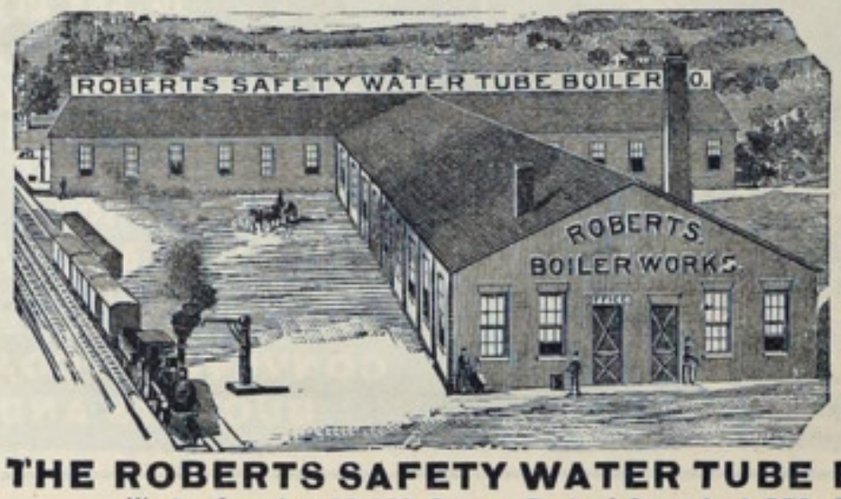

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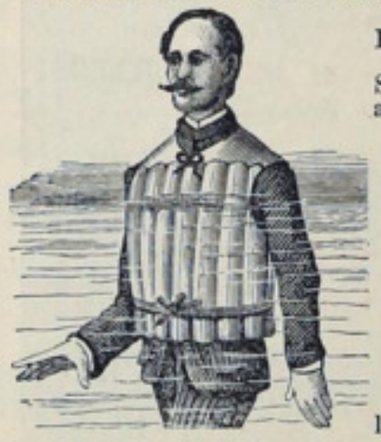

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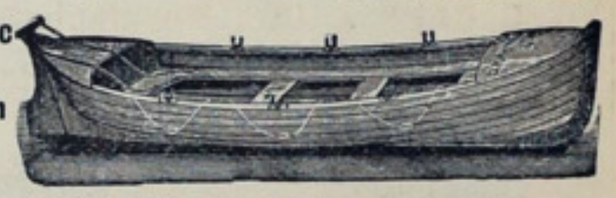

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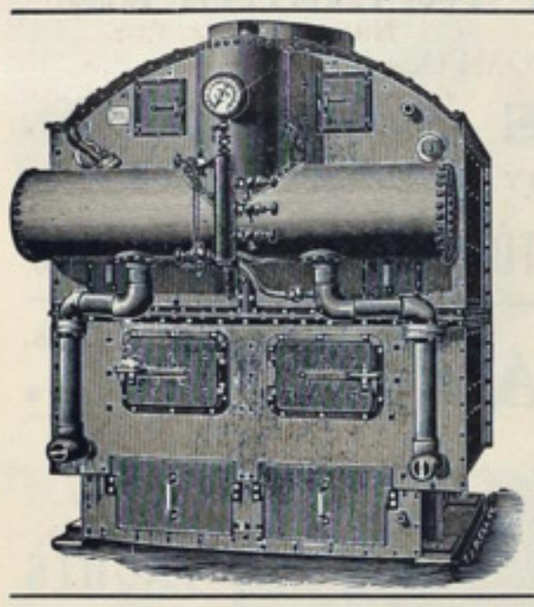

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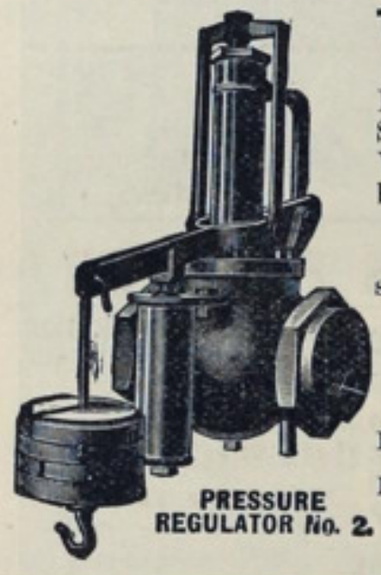

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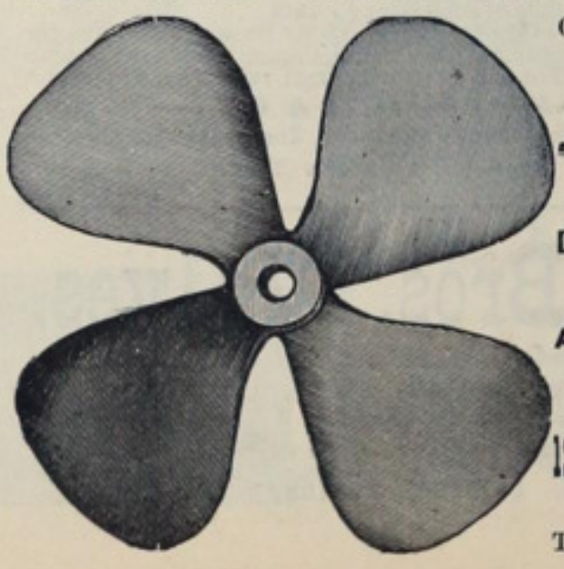

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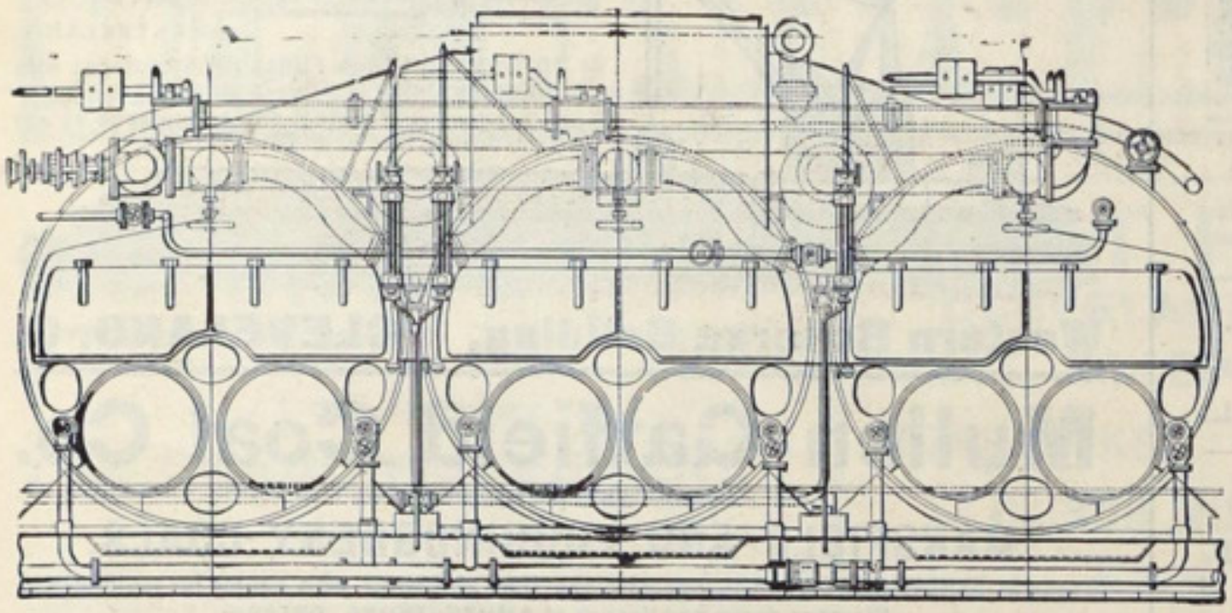

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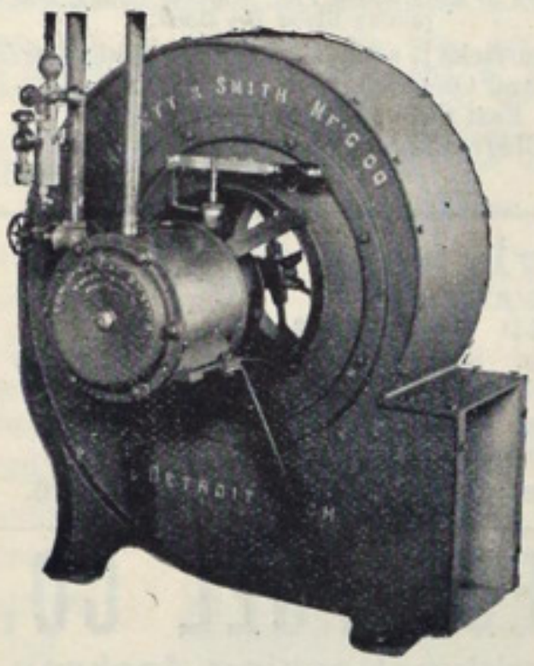

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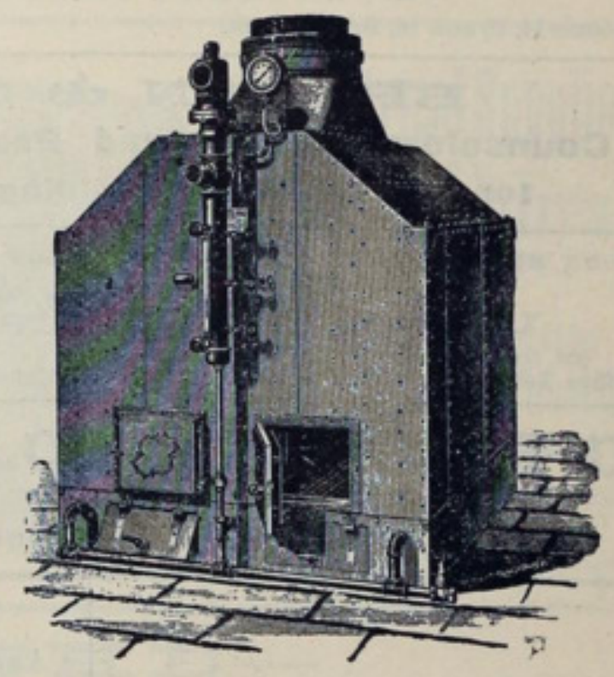

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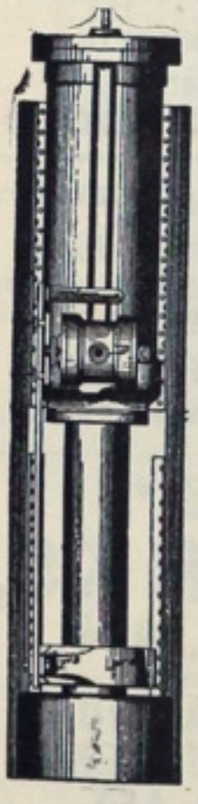

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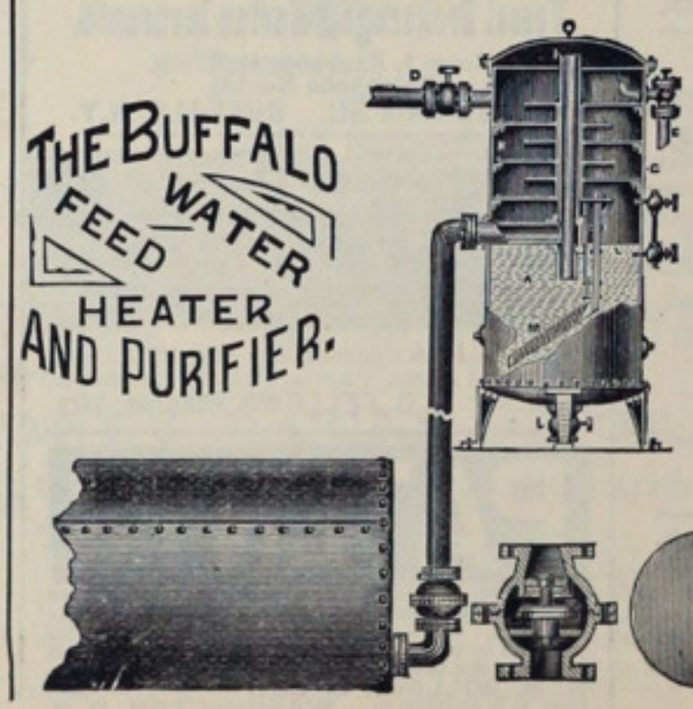

REFERENCES.

A.—Settling chamber.
B.—Boiler.
C.—Feed pipe to boiler.
D.—Steam pipe.
E.—Water supply pipe.
F.—Check valve.
G.—Spray disks.
H.—Spray chamber.
I.—Equalizing tube.
J.—Blow-off pipe.
K.—Automatic shut-off valve.
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